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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,609	11/12/2003	Masaichi Akiho	9333-362	5858

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CHICAGO, IL 60610

EXAMINER
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SAUNDERS JR, JOSEPH

ART UNIT	PAPER NUMBER
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2615

MAIL DATE	DELIVERY MODE
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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/706,609	Applicant(s) AKIHO, MASAICHI	
	Examiner Joseph Saunders	Art Unit 2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 November 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>11-12-03</u> . | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. This is the initial office action based on the application filed November 12, 2003.

Claims 1 – 15 are currently pending and considered below.

### *Drawings*

2. Figures 2 – 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. Figure 2 ~~is~~ corresponds directly to Figure 1 of the prior art JP 5-344078 mentioned in the specification in Paragraph 11. Figure 3 is a graph of the input and output characteristics of the soft-clipping gain adjustment section 101 shown in Figure 2, see specification Paragraphs 46 – 52 and Figure 4 of JP 5-344078. Figure 4 illustrates a "conventional" digital amplifier, disclosed in the specification Paragraph 35. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 52, 201, 202, and 20 of Figure 5. Also in Figure 2 "Exponential Power Processor" is labeled "5" and should be corrected to "15".

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

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pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 6, 9, and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Eid (US 2002/0181717 A1), hereinafter Eid (citations are from English translation).

**Claims 1 and 11:** Eid discloses a digital amplifier for amplifying an input digital signal and a method for adjusting the gain of a digital amplifier for amplifying an input digital signal (Figure 1), comprising: a volume adjusting section for controlling the volume of the digital signal (volume gain block 64); and a gain adjusting section for performing gain adjustment by applying compression characteristics to the volume-controlled digital signal (limiter 74) (Paragraphs 22 and 23).

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**Claim 6:** Eid discloses the digital amplifier according to claim 1, and Eid further discloses wherein the gain adjusting section comprises a digital signal processor (limiter 74 is a digital processing block).

**Claim 9:** Eid discloses the digital amplifier according to claim 1; and Eid further discloses the digital amplifier further comprising: an analog input section for receiving an analog signal (head unit 12); and an analog-to-digital converter for converting the analog signal to a digital signal (analog to digital converter (ADC) 20-1) and providing the digital signal to the volume adjusting section (volume gain block 64) (Figure 1).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2 – 4, 7, 10 and 12 – 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eid (US 2002/0181717 A1) in view of Akiyasu et al. (JP 05344078A), hereinafter Akiyasu.

**Claims 2 and 12:** Eid discloses the digital amplifier and the method for adjusting the gain of a digital amplifier for amplifying an input digital signal according to claims 1 and 11, wherein the gain adjusting section applies the compression characteristics to the

input digital signal (limiter 74), which is converted to an output signal (Paragraphs 22 and 23), but *does not disclose* using a calculation based on an expression  $y=a\{1-1(1-[x])^n\}$ , where  $x$  is the input digital signal,  $y$  is the output signal,  $[x]$  is the absolute value of  $x$ ,  $n$  is an exponent representing the compression characteristics, and  $a$  is 1 for  $x \geq 0$  or -1 for  $x < 0$ . Eid does not say much about limiter 74 only that the output 76 of limiter 74 is input into a digital to analog (DAC) converter 78 and that the limiter 74 may employ a clip detection block, otherwise Eid is silent to the algorithm used to employ the limiter and therefore one of ordinary skill in the art at the time of the invention would be inclined to look elsewhere for suitable teachings on how to implement block 74.

Eid discloses adjusting the volume of the digital processing system with consideration given to the fact that the system is used in a vehicle, and teaches using vehicle input signals 66 or conditions of the vehicle to control the volume. Akiyasu discloses a similar method of using input conditions, noise, from a vehicle in order to adjust the compression property of a digital adjustable compressor therefore limiting the difference in loudness level between the softest and loudest sounds in order to make the audio audible which is necessary in a vehicle where noise from engine sound or wind would mask a soft sound and turning the volume up louder would make the soft sound audible but make loud sounds too loud (Paragraphs 1, 2, and 21). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the DSP 1 and change-over section 2 of Akiyasu in a system of Eid since the limiter of Akiyasu offers the benefit of adjustable compression based on noise level resulting in improved sound in a vehicle (Paragraph 8).

**Claims 3 and 13:** Eid and Akiyasu disclose the digital amplifier and the method for adjusting the gain of a digital amplifier for amplifying an input digital signal according to claims 2 and 12, and Akiyasu further discloses wherein the compression characteristics are variable by changing the exponent  $n$  (Degree change-over circuits switch the degree  $n$  of the operation expression used in signal processing of DSP according to the noise level inputted from noise level detector 22, Paragraph 12).

**Claims 4 and 14:** Eid and Akiyasu disclose the digital amplifier and the method for adjusting the gain of a digital amplifier for amplifying an input digital signal according to claims 3 and 13, and Akiyasu further discloses wherein the exponent  $n$  is variable according to an operation of a gain adjusting function (Degree change-over circuits switch the degree  $n$  of the operation expression used in signal processing of DSP according to the noise level inputted from noise level detector 22, Paragraph 12).

**Claim 7:** Eid and Akiyasu disclose the digital amplifier according to claim 2, and Eid and Akiyasu both further disclose wherein the gain adjusting section comprises a digital signal processor (limiter 74 is a digital processing block, Eid and digital signal processor (DSP) 1 of Figure 1, Akiyasu).

**Claim 10:** Eid and Akiyasu disclose the digital amplifier according to claim 2, and Eid discloses the digital amplifier further comprising: an analog input section for receiving an

analog signal (head unit 12); and an analog-to-digital converter for converting the analog signal to a digital signal (analog to digital converter (ADC) 20-1) and providing the digital signal to the volume adjusting section (volume gain block 64) (Figure 1).

7. Claims 5, 8, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eid (US 2002/0181717 A1) in view of Akiyasu et al. (JP 05344078A) and Cornelisse (US 2002/0076072 A1), hereinafter Cornelisse.

**Claims 5 and 15:** Eid discloses the digital amplifier and the method for adjusting the gain of a digital amplifier for amplifying an input digital signal according to claims 1 and 11, but *does not disclose* further comprising: a memory for storing an input-output conversion table corresponding to the input-output relationship defined by an expression  $y=a\{1-1(1-[x])^n\}$ , where  $x$  is the input digital signal,  $y$  is an output signal,  $[x]$  is the absolute value of  $x$ ,  $n$  is an exponent representing the compression characteristics, and  $a$  is 1 for  $x \geq 0$  or -1 for  $x < 0$ , wherein the gain adjusting function performs gain adjustment by referring to the input-output conversion table. Eid does not say much about limiter 74 only that the output 76 of limiter 74 is input into a digital to analog (DAC) converter 78 and that the limiter 74 may employ a clip detection block, otherwise Eid is silent to the algorithm used to employ the limiter and therefore one of ordinary skill in the art at the time of the invention would be inclined to look elsewhere for suitable teachings on how to implement block 74.



Eid discloses adjusting the volume of the digital processing system with consideration given to the fact that the system is used in a vehicle, and teaches using vehicle input signals 66 or conditions of the vehicle to control the volume. Akiyasu discloses a similar method of using input conditions, noise, from a vehicle in order to adjust the compression property of a digital adjustable compressor therefore limiting the difference in loudness level between the softest and loudest sounds in order to make the audio audible which is necessary in a vehicle where noise from engine sound or wind would mask a soft sound and turning the volume up louder would make the soft sound audible but make loud sounds too loud (Paragraphs 1, 2, and 21). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the DSP 1 and change-over section 2 of Akiyasu in a system of Eid since the limiter of Akiyasu offers the benefit of adjustable compression based on noise level resulting in improved sound in a vehicle (Paragraph 8).

Cornelisse discloses a digital loudness normalization control for personal amplification devices having a digital signal processor (Abstract). Cornelisse teaches an input/output transfer block 122 is modeled by an algorithm running in the core of DSP 46, Paragraph 50, and further discloses "the algorithm providing the input/output transfer function 122 may determine the output (i.e. gain signal 126) based on a look-up table 124 stored in non-volatile memory," Paragraph 54. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a look-up table as disclosed by Cornelisse to store in a memory the input/output transfer function of the algorithm in the DSP disclosed by Eid and Akiyasu, allowing for the benefit of the

gain value to be based upon indexed values of the input level (Paragraph 55) instead of calculating the gain block by block.

**Claim 8:** Eid, Akiyasu, and Cornelisse disclose the digital amplifier according to claim 5, and Eid and Akiyasu both further disclose wherein the gain adjusting section comprises a digital signal processor (limiter 74 is a digital processing block, Eid and digital signal processor (DSP) 1 of Figure 1, Akiyasu).

### ***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Saunders whose telephone number is (571) 270-1063. The examiner can normally be reached on Monday - Thursday, 9:00 a.m. - 4:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on (571) 272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



JS  
April 26, 2007



**SINH TRAN**  
**SUPERVISORY PATENT EXAMINER**